REMARKS

Applicants have amended the claims to more particularly define the invention taking into consideration the outstanding Official Action. Claim 11 has been amended to make the spelling corrections noted by the Examiner in the Official Action. Claim 10 has been amended to place it in proper Markush form and to make it clear that chronic viral and bacterial infections are two separate members of the Markush group.

The rejection of claim 9 as indefinite because it is not clear what degrees of Th1 cell mediated immune responses are considered encompassed by "excessive" has been carefully considered but is most respectfully traversed in light of the skill of one of ordinary skill in the art and the following comments.

Initially, Applicants would like to emphasize that the claims 9-17 of the present application are directed to a method of suppressing excessive Th1 cell mediated immune responses in a patient during ongoing infection and/or inflammation in the patient. At the same time as the Th 1 cell response is suppressed, the Th 2 cell response is stimulated when an appropriate amount of at least one type xanthophylls is administered to the patient.

The Examiner finds claim 9 indefinite because it is not clear what degrees of Th1 cell mediate immune responses are considered encompassed by "excessive". Applicants most respectfully submit that it would be evident for any person in the medical field, that is one of ordinary skill in the art, that excessive Th1 cell mediate immune responses in a patient means enhanced responses with regard to normal or balanced responses in that patient. Therefore, the term excessive would be fully understood by one of ordinary skill in the art to which the invention pertains and the rejection should be withdrawn. The alteration of the balance between Th1 and Th2 activities in accordance with the instant invention is explained below.

Th1 and Th2 activities reflect physiological conditions. In several diseases this balance may be altered, (Th1 lowered/raised and/or Th2 lowered/raised). A modulator of this balance therefore necessarily acts on many types of diseases. In the present

invention, a shift from excessive Th1 response to a moderate Th1 response and at the same time an increased Th 2 response is observed in a patient during ongoing infection and/or inflammation. Therefore the xanthophylls used in the method of the invention affects the physiological conditions of patients irrespective of the reason for the ongoing infection and/or inflammation, which is exemplified in claim 10 by stating that the excessive Th1 cell mediated immune responses are caused by at least one disease from the group of autoimmune diseases and chronic viral and intracellular bacterial infections, and further exemplified in claim 11 by specifically naming diseases, such as Crohn's disease, Insulin-dependant diabetes mellitus, and HIV virus infection.

Applicants wish to point out that it should be understood that the xanthophylls used in the method of the invention is not intended to be curative as such, but to be beneficial for the patient by shifting the balance of Th1/Th2 responses during ongoing infection and/or inflammation, i.e shifting from an excessive Th1 response during continued trigging e.g. by bacteria to a more balanced Th1/Th2 response.

This effect has never been disclosed before in the literature. Prior art literature is based on in vitro trials and partially in vivo trials where an increased Th2 response has been seen. Accordingly, it is most respectfully requested that this rejection be withdrawn.

The rejection of claims 9-12 under 35 U.S.C. 102(b) as anticipated by U.S. Patent 5,886,053 has been carefully considered but is most respectfully traversed. In the Official Action it is recognized that the '053 patent does not specifically teach that the treatment of Crohn's disease with astaxanthin has the same effects on T cells as those claimed by applicant. However, these effects are said to be inherent in the method taught by the '053 patent because the reference teaches using the same composition to treat the same disease. It is concluded that if the method taught by the reference does not have these effects then Applicants' invention would not function as claimed. This rejection has been carefully considered but is most respectfully traversed.

The '053 patent discloses that a pharmaceutical preparation containing carotenoids may be used for the treatment of inflammatory diseases that are not caused

by exposure to light or by microorganisms. The preparation is predominantly directed towards treatment of dermatoses. The Examiner refers to column 1, line 25 and column 2, line 45 where Chron's disease and astaxanthin are mentioned. However, a lot of diseases are mentioned but the patent application only discloses experiments with beta-carotene on mast cells and monocytes, and here the inhibition of the histamine release caused by beta-carotene is investigated. In this context Applicants would like to point out that beta-carotene does not belong to the group xantophylls and that astaxanthin is only mentioned in the list of compounds.

There is no evidence in the '053 that astaxanthin would have any effect on Crohn's disease. This is only speculation and does not meet the burden to establish that the present invention is inherent in the prior art. In Applicants' opinion such unfounded suggestions cannot be regarded as novelty-destroying and an anticipation of the claimed invention. In fact, the'053 patent has not been maintained. Accordingly, it is most respectfully requested that this rejection be withdrawn.

The rejection of claims 9 and 13-17 under 35 U.S.C. 103 as being unpatentable over the '053 patent in view of the '502 patent has been carefully considered but is most respectfully traversed.

It is urged that the '053 patent is considered to teach the claimed method of treating Crohn's disease with astaxanthin. This statement is specifically traversed for the reasons discussed above.

It is also said that U.S. Patent '502 teaches that astaxanthin derived from *Haematococcus* is esterified with fatty acids. It is then concluded that based on this disclosure a person of ordinary skill in the art would understand the benefits of using astaxanthin and taught by the '502 reference in the method of treatment taught by U.S. '053. However, one does not find the necessary motivation to make the necessary combination to arrive at the presently claimed invention in the prior art. The '502 reference is concerned with a method for increasing the production of/in breeding and production animals in the poultry industry. Astaxanthin derived from Haematococcus is esterified with fatty acids and is actually used in the instant invention. So, it would not

have been unobvious for a man skilled in the art to try astaxanthin derived from Haematococcus but obvious to try is not the standard of obviousness under 35 USC 103. Moreover, in Applicants' opinion, it would have been unobvious to try astaxanthin for modulation of the Th1/Th2 response in a patient, let alone with the necessary expectation of success.

Indeed, astaxanthin mediates a shift in the Th1/Th2 response towards Th2. This means that there is still Th1 activity left. This shift in balance is the unique finding on which the present invention is based, and it may be valuable that there is still some Th1 activity left. Accordingly, it is most respectfully requested that this rejection be withdrawn.

In view of the above comments and further amendments to the claims, favorable reconsideration and allowance of all of the claims now present in the application are most respectfully requested.

Respectfully submitted,

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